Progressive familial heart block (type I)

A follow-up study after 10 years

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Summary

A follow-up study was done on 55 patients, all members of families with type I progressive familial heart block (PFHB) examined during 1977. Of the 55 patients 5 had died, 17 had normal ECGs while 7 with previously abnormal ECGs remained unchanged. All the others had progressed to a more severe form of heart block and 8 of them had received permanent pacemakers. These findings again emphasise the importance of regular ECG follow-up examinations of members of PFHB families.

S Afr Med J 1988; **73:** 275-276.

During 1977 Brink and Torrington[1] described the existence of a new autosomal dominant inherited familial heart disease (progressive familial heart block (PFHB), type I), which primarily affects the conduction tissue of the heart. The progressive nature of the disease was deduced from the history obtained from the family — a high percentage of their members died of 'heart problems' (22 members in generations 3, 4 and 5), with peak periods during the first year of life, puberty and during the fourth decade.

The ECG features of type I PFHB described by Brink and Torrington[1] and Van der Merwe *et al.*[2] were sinus bradycardia (SB), right bundle branch block (RBBB), left anterior hemiblock (LAHB), left posterior hemiblock (LPHB), complete heart block (CHB) with narrow or broad complexes. Sinus bradycardia, a feature of type II PFHB, appears to be just as common in type I.[1,2]

Clinical and ECG confirmation of the progressive nature of the disease was described by Van der Merwe *et al.*[2]

This recent study was prompted by observation of a patient who had had a normal ECG until the age of 39 years, and developed SB, RBBB and LPHB over a period of 3 years without any signs and symptoms of coronary heart disease. The aim of the study was to re-examine the patients seen by Brink and Torrington[1] during 1977 to find out whether the natural history of type I PFHB could be established.

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Accepted 10 Feb 1987.

Patients and methods

Fifty of the 55 patients examined during 1977 were located and subjected to clinical and ECG re-evaluation. The 5 members not examined had died during the previous 10 years.

Standard 12-lead ECGs were carried out on these 50 patients and compared with those taken in 1977.

Results

Five of the 55 1977 patients had died during the previous 10 years. Three were said to have died of myocardial infarction (1 with a normal ECG and 2 with CHB during the 1977 study). The other deaths were thought to be due to chronic rheumatic heart disease and carcinoma of the liver. The 2 with CHB had received permanent pacemakers before the 1977 study. All 5 of these patients were members of generation 6 and had a mean age of 69,8 years.

Between the 1977 and 1986 study 8 more patients had received permanent pacemakers because of the development of CHB and syncopal attacks. Their ECG findings during the previous study were as follows: 4 patients had RBBB (1 developed LAHB), 2 patients had bifasicular heart blocks (RBBB + LAHB) and 2 patients had RBBB with a PR interval of 0,20 seconds (Table I).

In the present study, of the 10 patients who had had unifascicular RBBB in the previous study 1 had progressed to LPHB and SB, 1 had developed RAD, 2 had developed SB, 1 patient's ECG showed only an incomplete RBBB while an 18-year-old boy had

TABLE I. 1977 AND 1986 ECG FINDINGS

1977	No. of patients	1986	No. of patients
RBBB	**14**	**Unchanged**	**3**
		Death	**1**
		RBBB+LPHB	**1**
		RBBB+RAD	**1**
		RBBB+SB	**2**
		SB+RAD+ST-segment elevation	**1**
		Incomplete RBBB	**1**
		Received pacemakers	**4**
RBBB+PR=0,20 s	**2**	**CHB+pacemaker**	**2**
RBBB+LAHB	**2**	**CHB+pacemaker**	**2**
LAHB	**1**	**LAHB**	**1**
LAD	**1**	**LAD**	**1**
Short PR interval	**2**	**PR interval = 0,12 s**	**2**
CHB+pacemaker	**6**	**Deaths**	**2**
		Alive	**4**
Normal	**27**	**SB**	**6**
		Prolonged PR interval	**2**
		Normal	**17**
		Deaths	**2**
Total	**55**		**55**

RBBB = right bundle branch block; LPHB = left posterior hemi-block; RAD = right axis deviation; SB = sinus bradycardia; LAHB = left anterior hemi-block; CHB = complete heart block; LAD = left axis deviation.

TABLE II. SEX AND AGE DISTRIBUTION OF PATIENTS WITH PERMANENT PACEMAKERS

Case	Sex	ECG findings	Present age (yrs)	Age at pacemaker implantation (yrs)	Mean age	Generation
1	F	CHB	76*	62		6
2	M	RBBB+LAHB	63	62	60,5	6
3	M	RBBB+LAHB	56	55		6
4	F	CHB	73*	63		6
5	F	CHB	43	31		7
6	F	CHB	41	29		7
7	M	RBBB	40	35	30,8	7
8	M	RBBB	38	37		7
9	F	RBBB+PR = 0,20 s	19	18		7
10	F	RBBB+PR = 0,20 s	24	23		7
11	M	CHB	19	13 mo.		8
12	M	RBBB	13	12	9,8	8
13	M	RBBB	33	26		8
14	F	CHB	13	14 d		8

Patients with CHB received pacemakers before the 1977 study.
*Died during the previous 10 years.
RBBB = right bundle branch block; LAHB = left anterior hemi-block; CHB = complete heart block.

developed RAD and ST-segment elevation in the inferior ECG leads without any evidence of underlying ischaemic heart disease. Three patients' ECGs remained unchanged and 1 patient had died of rheumatic heart disease (Table I).

Of 27 patients with normal ECGs during 1977 6 had developed SB, 2 patients showed prolongation of the PR interval and 2 had died (Table I) while 17 remained normal.

Discussion

The claim that 3 patients had died of myocardial infarction is supported by the following facts: their age (mean age 69,8 years), 2 had permanent pacemakers and hypercholesterolaemia[3] was also found in their families.

The progressive nature of PFHB is again emphasised. No fewer than 16% of the people in the first study (8 patients) with RBBB, RBBB + LAHB, RBBB + LPHB and RBBB + a PR interval of 0,20 seconds respectively developed CHB, syncopal attacks and received permanent pacemakers. These findings clearly show that a member of the PFHB families with RBBB or bifascicular heart block is prone to develop CHB with related syncopal attacks.

There was no difference in the sex distribution of pacemaker recipients. The mean age of pacemaker implantation was much lower in generation 8 (9,8 years) than in generation 7 (30,8 years) and in generation 7 than in generation 6 (60,5 years). It appears that members of the younger generations are more severely affected at a younger age than members of the older generations ($P < 0,01$) (Table II). This phenomenon is an excellent example of the anticipation theory, a term used in autosomal dominant conditions implying that with succeeding generations the disorder occurs progressively at an earlier age. Although the anticipation theory has no known biological explanation, it is so intimately related to a definite symptom complex (syncopal attacks with CHB) in our cases and not to an asymptomatic phenotype, that the phenomenon probably deserves further investigation.[4]

It is thus very important that members of generation 8 with ECG abnormalities are regularly followed up, especially in the light of our present findings.

The study also showed that the disease does not progress in a predictable manner, so that a normal ECG at any stage does not exclude the presence of underlying conduction tissue involvement.[2]

Conservative estimates show that a minimum of 9 000 individuals are affected by PFHB.[3] Therefore it is of vital importance that more members of this particular family should be identified.

In a 10-year follow-up no deaths had occurred which could be directly attributed to the progress of heart block. The members of this family's awareness of the condition and their periodic examinations were apparently successful and resulted in timely intervention by the implantation of pacemakers in 8 patients.

We would therefore, at this stage, without having more accurate indications of the rate of progress advise at least 6-monthly follow-ups with ECGs in patients with any known degree of heart block and at least yearly examinations in members of affected families with normal ECGs.

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